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## DNA Technology in Court

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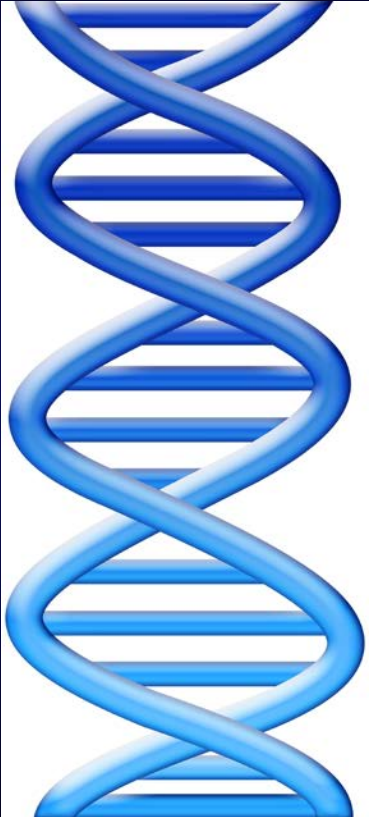
# DNA technology in court

Dan E. Krane, Wright State University, Dayton, OH

**Forensic DNA Profiling Video Series**

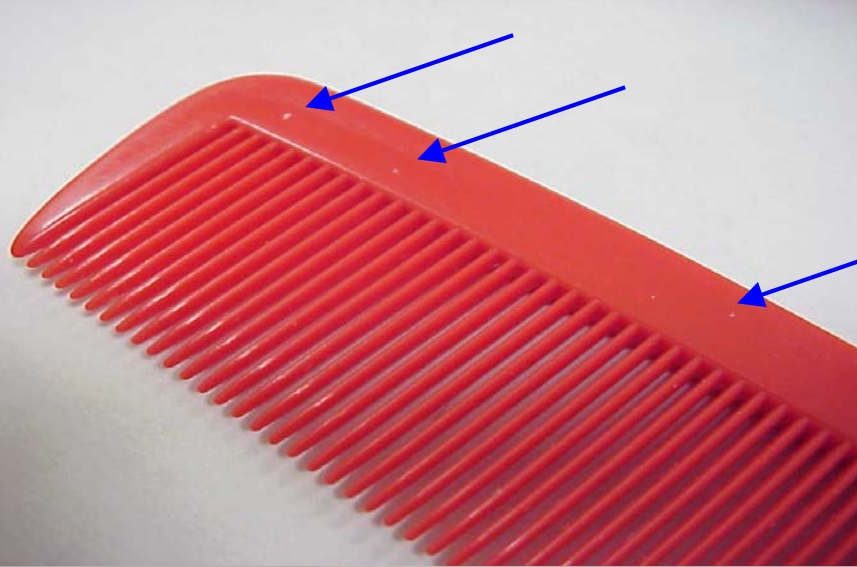
Forensic Bioinformatics  
([www.bioforensics.com](http://www.bioforensics.com))

# DNA technology in court



- Criminal Prosecution
  - Unprecedented sensitivity and specificity for typing biological samples
  - Growing use of databanks and dragnets to identify suspects
  - Rapidly becoming cheaper and faster

# Possible DNA sources

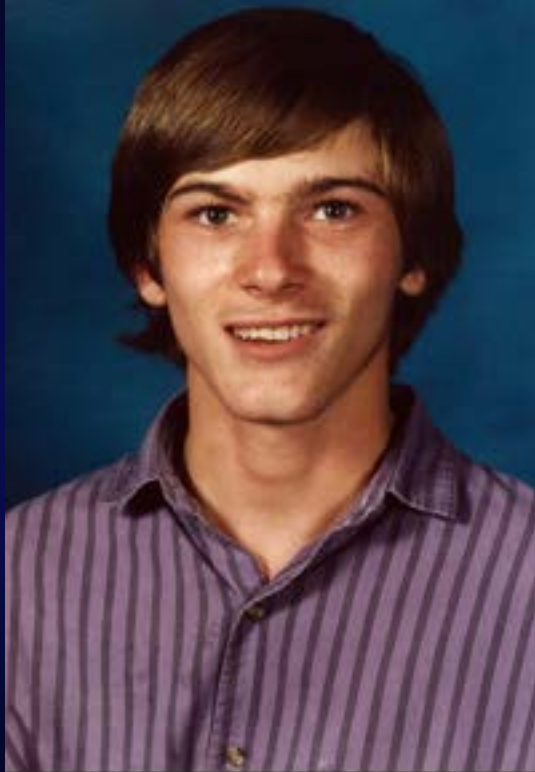


# DNA technology in court



- Criminal Defense
  - Unprecedented sensitivity and specificity for typing biological samples
  - Potential support for alternative theories of the case
  - Generation of alternative suspects

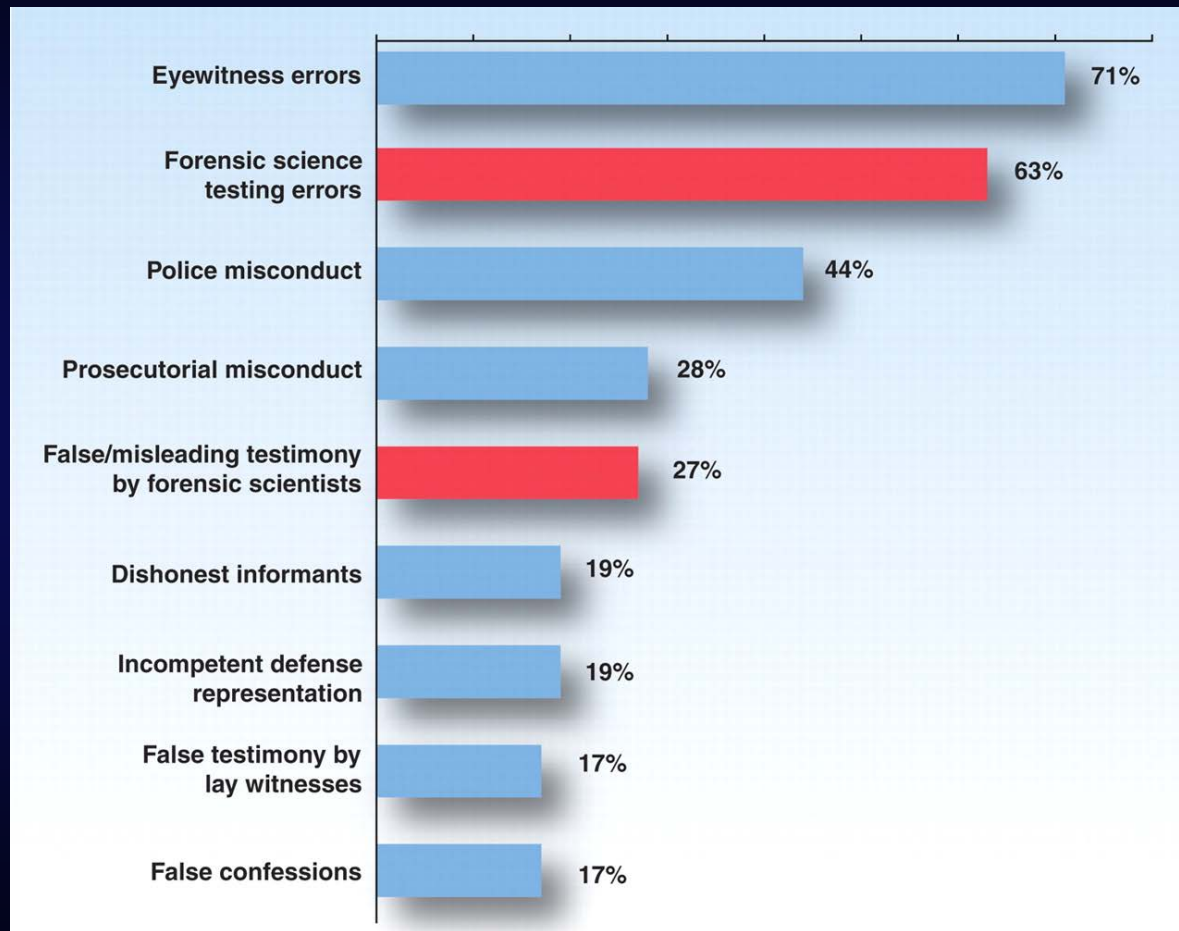
# DNA technology in court



**300** EXONERATIONS  
AND COUNTING

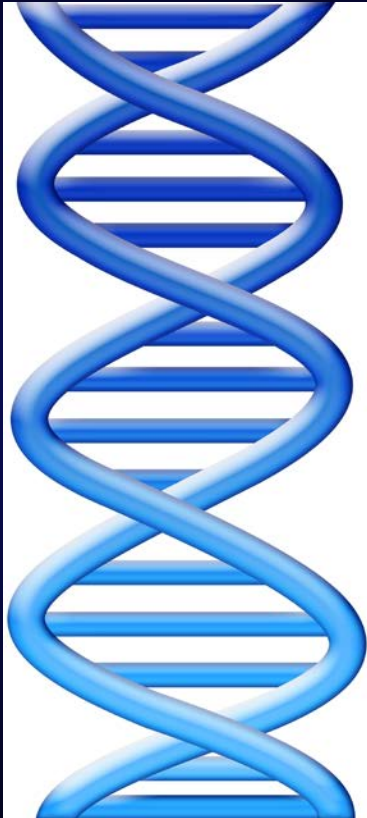
- Post-conviction exonerations (300 as of September, 2012) based on DNA evidence have revealed problems with the justice system

# Factors associated with wrongful convictions



Saks & Koehler,  
*Science* (2005)

# What is a good source of DNA?



- Blood, saliva, semen, tissues, pretty much anything that comes in contact with a person.



# DNA content of biological samples



Trillions of cells

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Trillions of cells



Roughly 100  
cells

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Each cell contains 6 to 7 pg of DNA

DNA profiling kits generally recommend using  
between 500 and 1,000 pg of template DNA

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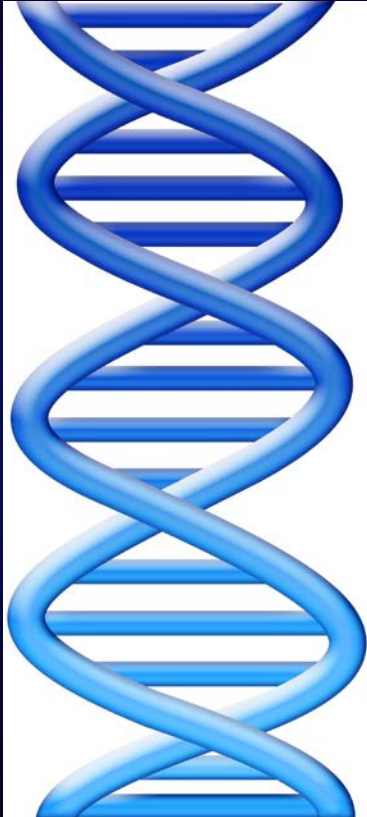
That works out to roughly 100 to 200 cells

# What is a picogram?



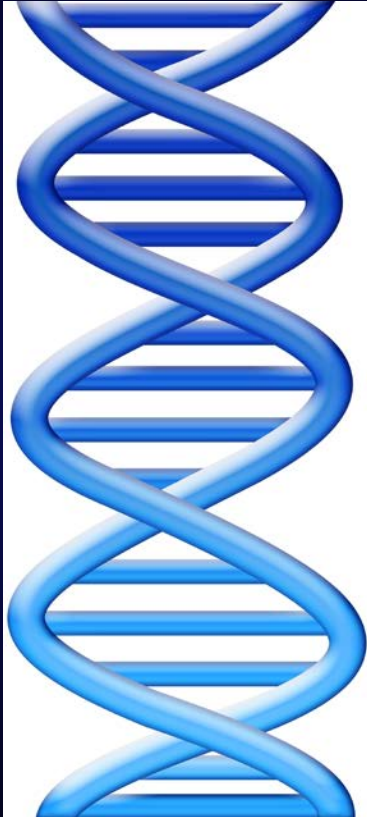
- 1 gram =  $1/4^{\text{th}}$  of a packet of sugar
- 1 milligram = a single crystal of sugar
- 1 nanogram = one  $1000^{\text{th}}$  of a crystal of sugar
- 1 picogram = one billionth of a gram

# What is a good source of DNA?



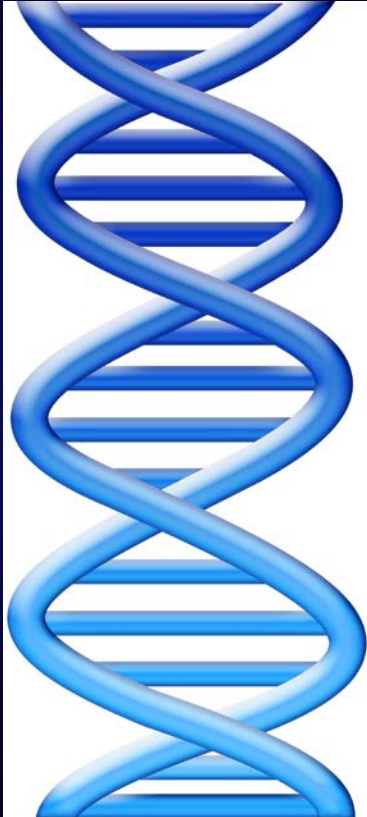
- Blood, saliva, semen, tissues, pretty much anything that comes in contact with a person.
- But, the presence of a DNA profile says nothing about the time frame or circumstances of its transfer.

# How is DNA analyzed?



- Isolation and purification
- PCR amplification
- Size fractionation
- Computer processing
- Statistical weighting

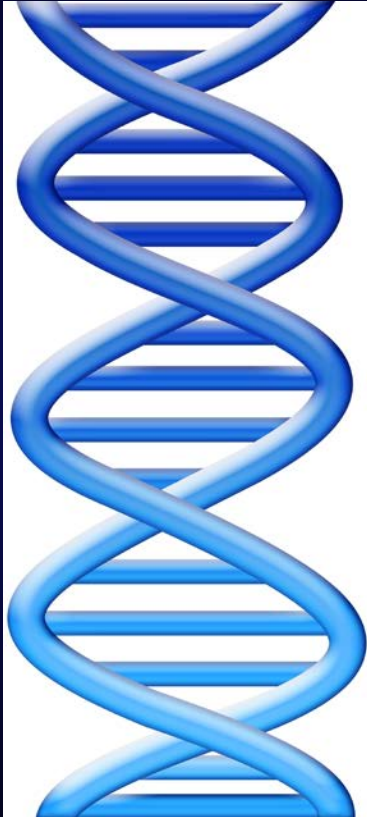
# DNA technology in court



- Used in prosecutions, defenses, and post-conviction

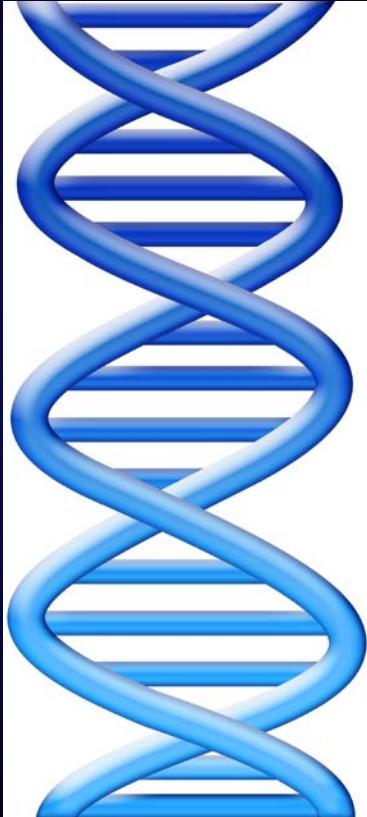


# DNA technology in court



- Used in prosecutions, defenses, and post-conviction
- DNA tests are very sensitive

# DNA technology in court



- Used in prosecutions, defenses, and post-conviction
- DNA tests are very sensitive
- Test results need to be interpreted carefully

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